

# PATENT ABSTRACTS OF JAPAN

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## (54) RESIN COMPOSITION WITH IMPROVED FLAMMABILITY

(57)Abstract:

PURPOSE: To obtain the title composition which is reduced in the generation of black smoke and a harmful gas when a plastic waste is incinerated.

CONSTITUTION: The title composition comprises a thermoplastic resin, preferably one member selected from among polyethylene, polypropylene, polystyrene, polyesters, polycarbonates, poly(vinyl chloride), and polyamides, and a rare earth metal compound (a), preferably at least one member selected from among organic or inorganic metal salts of cerium, neodymium, lanthanum, samarium, praseodymium, promethium, yttrium, gadolinium, and mixtures thereof, the amount of the compound (a) being 0.01-5wt.% in terms of rare earth metal amount.

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## CLAIMS

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### [Claim(s)]

[Claim 1] The resin constituent which improved the flammability characterized by blending it 0.01 to 5% of the weight, having used as the rare earth metal at least one sort chosen as thermoplastics from rare earth metallic compounds.

[Claim 2] The resin constituent which improved the flammability characterized by thermoplastics according to claim 1 being one sort selected from polyethylene, polypropylene, polystyrene, polyester, the polycarbonate, the polyvinyl chloride, or the polyamide.

[Claim 3] The resin constituent which improved the flammability characterized by thermoplastics according to claim 1 or 2 being one sort selected from crystalline plastics.

[Claim 4] The resin constituent which improved the flammability characterized by rare earth metallic compounds according to claim 1 being at least one sort chosen from the organic-metal salt or the inorganic metal salt of a cerium, neodymium, a lanthanum, samarium, plastic SEOJUMU, a promethium, an yttrium, gadoliniums, and such mixture.

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] When plastics is used, this invention becomes a waste plastic and it carries out combustion abandonment, it improves flammability, suppresses generating of a black smoke, and generating of harmful gas, and relates to the resin constituent which reduces environmental pollution.

#### [0002]

[Description of the Prior Art] Now, many plastics is used in the use field of the tree from the former, paper, and a metal, and the quantity of production of all domestic plastics (thermoplasticity and thermosetting plastic) has reached [ per year ] in about 12,500,000t.

[0003] Although, as for these plastics, back-discarded [ which was used for each use ], since its flammability is bad and its generating of heat of combustion is large in generating a black smoke or generating harmful gas when conventional plastics carries out combustion processing, the present condition is that reclamation disposal of most waste plastics is carried out in the reason of damaging a combustion furnace.

[0004] However, after reclamation processing is carried out, under natural environment, reservation of reclaimed ground is becoming a social problem, and it is hard to be decomposed and plastics remains over many years in the underground of reclaimed ground, the additive scoured by plastics, a compounding agent, and an adhesion component are eluted, or it has been the problem that the environmental pollution by the harmful gas which plastics decomposes and occurs is big.

[0005] About the damage problem of the combustion furnace which originates in the high heat of combustion of the present plastics on the other hand, improvement of combustion methods, such as improvement of internal insulation and mixed firing with low exoergic scrap wood, is solved mostly.

#### [0006]

[Problem(s) to be Solved by the Invention] However, the present condition is that sufficient cure is not made to generating of the inflammable improvement of a waste plastic, the black smoke resulting from this, or harmful gas.

[0007] this invention solves this technical problem, and in case the purpose of this invention carries out combustion processing of the waste plastic, it is to offer the resin constituent which improved the flammability which can suppress generating of a black smoke and harmful gas.

[0008]

[Means for Solving the Problem] This invention persons found out being improved to transparency in crystalline plastics while not spoiling the physical properties of the resin concerned but improving the flammability of the resin concerned sharply by scouring a rare-earth-metal compound 0.01 to 5% of the weight to thermoplastics, and carrying out lump distribution, as a result of inquiring wholeheartedly, in order to solve the above-mentioned technical problem.

[0009] that by which this invention was made based on this knowledge -- it is -- thermoplastics -- desirable -- polyethylene -- One sort selected from polypropylene, polystyrene, polyester, the polycarbonate, or the polyvinyl chloride polyamide, To the crystalline plastics of the aforementioned thermoplastics, preferably especially A rare-earth-metal compound, Preferably A cerium, neodymium, a lanthanum, samarium, plastic SEOJUMU, It is the resin constituent which improved the flammability which consists of having blended at least one sort chosen from the organic-metal salt or the inorganic metal salt of a promethium, an yttrium, gadoliniums, and such mixture 0.01 to 5% of the weight as rare earth metal.

[0010] Although the resins which can apply this invention are thermoplastics, such as polyethylene, polypropylene, polystyrene, polyester, a polycarbonate, a polyvinyl chloride, and a polyamide, transparency can also be raised if crystalline plastics, such as polyethylene, polypropylene, polyester, and a polyamide, is used especially. .

[0011] Moreover, inorganic metal salts, such as organic-metal salts, such as a consisting [ of what is called the mixed rare earth (it considers as a "rare earth" below) and concentration rare earth of the form mixed as a rare-earth-metal compound before dividing a cerium, neodymium, a lanthanum, samarium, plastic SEOJUMU, a promethium, an yttrium, gadoliniums, and those mixture, for example, rare earth elements into each element ] metallic soap, a carbonate, and a chloride, can be used.

[0012] As an organic acid which manufactures an organic-metal salt with rare earth, octylic acid, a neo decanoic acid, stearin acid, oleic acid, a lauric acid, a naphthenic acid, etc. are mentioned, and an octylic acid cerium, octylic acid neodymium, an octylic acid lanthanum, octylic acid samarium, an octylic acid yttrium, an octylic acid praseodymium, an octylic acid gadolinium, an octylic acid rare earth, a naphthenic-acid cerium, naphthenic-acid neodymium, a naphthenic-acid yttrium, a naphthenic-acid rare earth, a stearin acid lanthanum, a stearin acid rare earth, and a neo decanoic-acid rare earth are mentioned as a concrete compound.

[0013] Especially the loadings of these rare-earth-metal compounds have 0.02 - 2 desirable % of the weight 0.01 to 5% of the weight as rare earth metal. At 0.02 or less % of the weight, it is not desirable from transparency and appearance becoming bad, if improvement of flammability [ loadings ] is not enough and blends 5% of the weight or more, and mechanical physical properties etc. falling.

[0014] It considers as the method of using a monopodium kneading extruder, a 2 shaft kneading extruder, a Brabender, a mixer, a kneader, etc., and improving dispersibility as a method of blending these rare-earth-metal compounds with plastics, and the method of using the preliminary mixture by the super mixer or the tumble mixer and a rare-earth-metal compound for it, dissolving or distributing the organic solvent etc. can be used.

[0015]

[Example]

(Example 1) Carry out kneading extrusion of stearin acid rare earth (La;3.2wt% and Ce;5.5wt% and Pr;0.6wt% and Nd;2.6wt%) 100g and the polypropylene (Japanese ore-ized company product : 4700 JG) 10kg using a continuation kneading machine (the product made from KCK, 70-22VEX type) after carrying out preliminary mixture using a super mixer (the Kawata Mfg. make, SM-V -20 type). It pelletized and the polypropylene containing a stearin acid rare earth was obtained.

[0016] The test piece was fabricated for the polypropylene containing the obtained stearin acid rare earth using the injection molding machine (made in the Yamashiro energy machine factory, SVA-60 -52 type). Flammability and physical physical properties (a bending elastic modulus, Izod impactive strength, \*\*\*\* yield strength) were evaluated using the test piece obtained with injection molding. The light transmittance at the time of combustion (namely, smoke density) estimates flammability using an inflammable testing machine (SUGA testing-machine company make, ON-1 type), and a bending elastic modulus, Izod impactive strength, and \*\*\*\* yield strength are JIS, respectively. It measured by the method of the convention to K7203, K7110, and K6758. These results were shown in Table 1.

[0017]

[Table 1]

| 実施例<br>No. | 希土類金属<br>化合物    | PHR | 燃焼性<br>(%) | 曲げ<br>弾性率<br>(kg/cm <sup>2</sup> ) | アイソット衝撃<br>強度(23℃)<br>(kg·cm/cm <sup>2</sup> ) | 引張降伏<br>強度<br>(kg/cm <sup>2</sup> ) |
|------------|-----------------|-----|------------|------------------------------------|--|-------------------------------------|
| 1          | ステアリン酸<br>レアアース | 1   | 99         | 16,900                             | 3.3  | 390                                 |
| 2          | ナフテン酸<br>レアアース  | 1   | 99         | 17,000                             | 3.5  | 390                                 |
| 3          | 同上60%<br>キシレン溶液 | 1   | 99         | 17,100                             | 3.5  | 395                                 |
| 4          | 同上              | 0.2 | 97         | 17,300                             | 3.6  | 400                                 |
| 5          | オクチル酸<br>セリウム   | 1   | 99         | 16,800                             | 3.5  | 385                                 |
| 6          | レアアース<br>の炭酸塩   | 1   | 98         | 16,400                             | 3.0  | 366                                 |
| 比較例        |                 | —   | 88         | 16,800                             | 3.3  | 386                                 |

PHR：ポリプロピレン100重量部に対する希土類金属化合物の重量部

[0018] (Examples 2-6, example of comparison) Using the 60-% of the weight xylene solution of a naphthenic-acid rare earth (rare-earth-elements composition is the same as an example 1), and the aforementioned naphthenic-acid rare earth, an octylic acid cerium, and the carbonate powder (rare-earth-elements composition is the same as an example 1) of a rare earth, it blended with polypropylene like the example 1, and inflammable evaluation and measurement of a physical property were performed. Moreover, as an example of comparison, about the polypropylene which does not add a rare-earth-metal compound as well as an example, kneading processing was carried out, the test piece was fabricated, and inflammable evaluation and measurement of a physical property were performed. The result was shown according to Table 1. Moreover, according to visual observation, compared with the example of comparison which is not added, transparency of what blended rare earth metallic compounds was improving clearly.

[0019]

[Effect of the Invention] Without spoiling the physical properties of the resin concerned, flammability is improved, and since the thermoplastics which blended the rare-earth-elements compound of this invention can reduce generating of a black smoke etc., and generating of harmful gas in case combustion abandonment is carried out, the combustion processing of a waste plastic of it does not need to be attained, it does not need to reclaim land and process, and does so the exceptional effect that the problem of the environmental pollution from the reclamation processing ground is also solvable.

[0020] Moreover, the exceptional effect that transparency is improvable is also done so

by crystalline plastics among the thermoplastics which blended the rare-earth-elements compound of this invention